

Approved

**Enbridge Line 6B MP 608
Marshall, MI Pipeline Release**

**Addendum to the revised Waste Treatment, Transportation
and Disposal Plan (May 20, 2011)**

**Commonly Referred to as the
“Waste Characterization and Oil Recovery
Sampling for Soils and Sediment”**

Prepared for United States Environmental Protection Agency

Enbridge Energy, Limited Partnership

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LIST OF ACRONYMS

ASTM	ASTM International
Enbridge	Enbridge Energy, Limited Partnership
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
Line 6B	The pipeline owned by Enbridge Energy, Limited Partnership that runs just south of Marshall, Michigan
MDEQ	Michigan Department of Environmental Quality
MP	Mile Post
O&M	Operations and Maintenance
ORO	Oil Range Organics
PCBs	Polychlorinated Biphenyls
PFT	Paint Filter Test
PNAs	Polynuclear Aromatic Hydrocarbons
ppb	parts per billion
RCRA	Resource Conservation and Recovery Act
SVOCs	Semivolatile Organic Compounds
TCLP analysis	Toxicity Characteristic Leaching Procedure designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes
TPH	Total Petroleum Hydrocarbons
ug/kg	micrograms per kilogram (parts per billion)
ug/l	micrograms per liter (parts per billion)
U.S. EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WTTD	Waste Treatment, Transportation and Disposal

1.0 INTRODUCTION

This addendum addresses waste characterization and oil recovery sampling for soils and sediment associated with the Enbridge Line 6B MP608, Marshall, Michigan Pipeline Release. Crude oil impacted soil and sediment (waste) includes excavated soil and sediment, soil stockpile scrapings, soil from decommissioned sites and areas, tar patties, frac tank sediment, spent carbon from site excavation dewatering treatment systems, sediment trap material, river sediments, investigative derived waste soil from sampling activities and monitoring well installation, and approved Resource Conservation and Recovery Act (RCRA) non-hazardous soil solidification agents.

Note: This letter does not address oily debris and oily impacted wood. Oily debris and oily impacted wood have previously been determined to be RCRA non-hazardous. Confirmation samples are collected from every fiftieth load of oily impacted debris for waste characterization.

Based upon all analytical data collected to date, Enbridge Energy, Limited Partnership (Enbridge) submits that all remaining soils and sediment affected by the crude oil spill are non-hazardous. Therefore, Enbridge proposes to minimize excavating and stockpiling of impacted soil and to proceed with direct load operations for soil removal. Visual inspections of soil and/or sediment and paint filter tests (PFTs) for free liquids will be conducted on site as described in the May 20, 2011 approved Waste Treatment, Transportation and Disposal (WTTD) plan which states:

All excavated materials will be visually inspected for free liquids. A PFT will be conducted in the field at each excavation site for both excavated soil and stabilized soil at a minimum of once per day. The person conducting the PFT will be competently trained to sample the soil and conduct the PFT at the excavation site. U.S. EPA Method 9095B, Paint Filter Liquids Test will be modified to use a sample jar instead of a graduated cylinder and the sample will be tested at ambient temperature. A minimum of one representative sample will be collected for PFT per excavation site on the basis of visual inspection by a designated individual. Additional PFT samples will be collected as needed based on further visual inspection and in coordination with U.S. EPA or its representative. The U.S. EPA, Michigan Department of Environmental Quality (MDEQ), Enbridge, or their respective

representatives may, at their sole discretion, require Enbridge to collect additional samples for waste characterization. Examples of where the U.S. EPA or MDEQ may invoke this right could include, among other situations: waste streams consisting of combined tank bottoms with soil; when free oil is present in a waste stream; and/or when the waste stream is saturated with oil.

2.0 PURPOSE

The purpose of this addendum is as follows:

- 1) To indicate that the existing analytical data sufficiently characterizes the crude oil impacted soils and sediment remaining at the site in accordance with ASTM D6044-96 Standard Guide for Representative Sampling for Management of Waste Contaminated Media for the purpose of disposal and ASTM D6009-96 (reapproved 2001) Standard Guide for Sampling Waste Piles as appropriate.
- 2) To indicate that further waste characterization sampling is not necessary to confirm that the crude oil impacted soils and sediment remaining at the site are characterized as non-hazardous unless requested by the U.S. EPA, MDEQ, or their respective representative.
- 3) To provide an alternate method for collecting composite soil samples for oil and grease analysis so that Enbridge will have a means of continuing to calculate oil recovery for soil even when soil is not stockpiled (i.e., directly loaded or accumulated in roll-offs).

3.0 GENERATOR KNOWLEDGE

Between August 5, 2010 and May 6, 2011 a total of 93,035 tons of soil and sediment has been transported for disposal. This total quantity also includes some woodchips and shredded debris. At the U.S. EPA's request, these wastes were mixed with the soil waste stream at certain times during the project to facilitate oil recovery estimates.

Of the 93,035 tons of soil and sediment removed from the site, a total of 15,941 tons of soil was transported as benzene contaminated hazardous waste (between August 5, 2010 and

November 4, 2010). The remaining 77,094 tons of soil was transported as non-hazardous waste (between August 25, 2010 and May 6, 2011).

The majority of the hazardous waste shipments (12,829 tons) occurred in August 2010. The remaining 3,112 tons of hazardous waste soil were from soil pile "Cell 5 Fill 5" which was transported for disposal between October 27, 2010 and November 4, 2010. This soil pile was characterized as benzene contaminated hazardous waste as determined from samples collected on October 18, 2010 and October 21, 2010. The benzene contamination in this soil pile was due to the addition of approximately 100,000 gallons of frac tank sludge for solidification. Cell 5 Pile 5 was the only soil pile that included frac tank sludge which was above RCRA criteria. As of January 2011, all frac tanks in service at the beginning of the spill have since been decontaminated and resultant material disposed. Therefore, this source of hazardous waste material is no longer present at the site.

Extensive waste characterization of the stockpiled soil, debris, and water waste streams has been completed. Soil samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP), volatile organic compounds (VOCs), TCLP semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), TCLP metals, oil and grease, total petroleum hydrocarbons (TPH) as diesel range organics (DRO) and gasoline range organics (GRO), and pH. As discussed above, only benzene has been detected in soil at levels which approach or exceed RCRA characteristic criteria. In addition, the in situ soil samples have not had benzene detections at levels which approach or exceed RCRA criteria since September 22, 2010. The benzene detected in soil stockpiles shipped as hazardous waste is summarized in the tables below.

Delineation and confirmation samples were collected of the river sediment, at operation and maintenance (O&M) areas and excavation areas. Based on Part 201 Criteria constituents of concern, these samples were tested for total VOCs, PNAs (a subset of the SVOCs list), oil range organics (ORO), DRO, GRO, beryllium, molybdenum, vanadium, and nickel. No contaminants have been detected at levels which would approach or exceed RCRA characteristic criteria.

Source materials were sampled during May 12, 2011 to May 16, 2011 in a recent sampling event conducted to estimate worst case levels of contaminants remaining on site. The sample media included tar patties, oiled sediment, impacted floodplain areas, and water with

sheen. No contaminants were detected that would trigger RCRA waste characteristic criteria in solid waste. Only benzene was detected in one tar patty at 280 micrograms per kilogram (ug/kg). This detection is well below 10,000 ug/kg or 20 times the RCRA criteria for TCLP benzene of 500 micrograms per liter (ug/l).

Hazardous Soil - Shipped Offsite

Dates Shipped	Cubic Yards ¹	Tons ²	Analytical Data			Laboratory
			SDG	Constituent	Maximum Concentration	
8/5-8/26/2010	15,344	12,829	1008090	Benzene	3,900 ug/kg	RTI
			1008158	Benzene	8,100 ug/kg	RTI
			S45178	Benzene	37,000 ug/kg	Merit
			S45179	Benzene	2,700 ug/kg	Merit
			S45196	Benzene	6,000 ug/kg	Merit
			S45197	Benzene	14,000 ug/kg	Merit
			S45259	Benzene	9,000 ug/kg	Merit
			S45260	Benzene	13,500 ug/kg	Merit
			S45261	Benzene	15,000 ug/kg	Merit
			S45294	Benzene	1,300 ug/kg	Merit
			S45300	Benzene	6,400 ug/kg	Merit
10/27-11/4/2010	4,300	3,112	S46250	TCLP Benzene	900 ug/l	Merit
			S46251	TCLP Benzene	1400 ug/l	Merit
			S46323	Benzene	28,000 ug/kg	Merit
TOTAL TONS SHIPPED		15,941				

¹Cubic yards of material is estimated per manifested load

²Tons of material is based on weight tickets from the disposal facility per manifested load

Non-Hazardous Soil - Shipped Offsite

Dates Shipped	Cubic Yards ¹	Tons ²	Comments
8/25-12/15/2010	64,815	62,144	Westside Recycling; Soil, wood chips & some debris; some benzene detections, mostly non detect for benzene
10/28-11/9/2010	5,562	6,119	Westside Recycling; Sediment from Ceresco; all non detect for benzene
1/20-5/6/2011	9,355	8,831	C&C Landfill; Soil; all non detect for benzene
TOTAL TONS SHIPPED		77,094	

¹Cubic yards of material is estimated per manifested load

²Tons of material is based on weight tickets from the disposal facility per manifested load

Based upon all soil analytical data reported to date, there has been only one low level detection of total benzene (280 ug/kg) since September 22, 2010 for in situ soil and no

detection of TCLP benzene since October 21, 2010 for soil stockpiles. Enbridge submits that enough analytical data has been collected to confidently state that the excavated soil remaining is non-hazardous. The analytical data collected satisfies the ASTM D6044-96 Standard Guide for Representative Sampling for Management of Waste and Contaminated Media.

4.0 OIL RECOVERY DOCUMENTATION FOR DIRECT LOAD SOIL DISPOSAL

The oil recovery documentation is an ongoing requirement for the Line 6B Enbridge response. The current oil recovery sampling procedure for stockpiles will require modification for using direct load procedures. The oil recovery sampling for soil directly loaded will be accomplished with the following procedure:

- 1) Single point aliquots will be collected from each truck load of soil that leaves the site. Samples aliquots will be composited for laboratory analysis as described herein. Sample aliquots will not be stored overnight waiting for additional loads to be generated at a future date, nor will full loads of soil be staged overnight without collection of a sample aliquot. Sample aliquots will be composited daily from up to 10 loads of soil. Composite samples may be held overnight at a secure location with proper chain-of-custody for delivery to the laboratory on the next business day.
- 2) Soil aliquots will be collected on the same day but may represent different soil or sediment sources impacted by crude oil from this spill.
- 3) Composite samples will be analyzed for oil and grease.
- 4) The sample's analytical result along with the tonnage from its respective loads will allow for the oil recovery calculation in the weekly oil recovery estimate.